

The effect of stocking rate and initial grass height on herbage production and utilization, and milk production per unit area under set stocking by lactating dairy cows

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Introduction In our previous study with lactating dairy cows (Nakatsuji *et al.*, 2004), annual herbage production and utilization, and milk production per unit area under set stocking was not always lower than under rotational grazing at the same stocking rate (6 cows/ha). Furthermore, there was a possibility that set stocking could increase pasture utilization and milk production over rotational grazing when cows were grazed at adequate stocking rate and at the appropriate initial date of grazing. The purpose of the present study was to evaluate the effect of stocking rate and initial grass height on herbage production and utilization, and milk production per unit area under set stocking by lactating dairy cows.

Materials and methods Three experimental pastures (0.66 ha each) differing in stocking rate and initial grass height were prepared: HL (6.1 cows/ha; 15 cm), HH (7.6 cows/ha; 15 cm) and LL (6.1 cows/ha; 8 cm). Four, five and four lactating Holstein cows were grazed for 5 hours per day on HL, HH and LL, respectively. In addition to grazing herbage, maize and grass silage were fed *ad libitum* to all cows in the barn. Concentrates were supplemented with roughages at 25% of daily milk yield. Herbage production and utilization were measured using protective cages set on each pasture. Milk production from pasture was calculated as follows: Total milk production x (herbage TDN intake / Total TDN intake). Total digestible nutrients (TDN) content of grazing herbage and silage were estimated by chemical compositions (Deguchi *et al.*, 1997).

Results The results of pasture utilization and milk production throughout the grazing period are shown in Table 1. Mean grass height was lower ($P < 0.05$) in HH and LL than in HL. However, TDN content of herbage did not differ across groups. Total herbage production did not differ across groups although stocking rate was higher in HH and grazing days were greater in LL than HL. Herbage utilization was higher in HH and LL than in HL because of a decrease in dung pats in HH and LL. Total TDN intake tended to be higher in HH than in HL and LL. Fat-corrected milk (FCM) yield from pasture in LL was similar to that in HL because low total FCM yield was compensated for by a high ratio of herbage to total TDN intake in LL. The FCM yield from pasture in HH was also similar to HL, in spite of high stocking rate in HH, because total FCM yield and the ratio of herbage to total TDN in HH were nearly equal to HL.

Table 1 Sward characteristics, herbage production and utilization and milk production from pasture throughout the grazing period

	HL	HH	LL
Initial grazing date	6 May	6 May	26 April
Total grazing days	162	162	172
Grass height, cm	15.7 ^a	11.9 ^b	10.8 ^b
Herbage mass, tDM/ha	3.3 ^a	2.6 ^b	2.2 ^c
TDN content of herbage, %DM	64.5	65.0	64.8
Herbage production, tDM/ha			
Growth before grazing	1.5	1.8	1.3
Regrowth	9.6	10.0	10.3
Total	11.1	11.7	11.6
Herbage utilization, tDM/ha	8.4	9.8	9.9
TDN intake, t			
Herbage (1)	3.6	4.2	4.3
Total (2)	10.1	11.8	10.3
(1) / (2), %	40.2	41.1	47.1
Total FCM yield, t	17.7	17.8	14.9
FCM yield from pasture, t/ha	9.6	9.7	9.5

^{abc}Means within rows with different superscripts differ ($p < 0.05$)

Conclusions Under set stocking as in the present study, the modification of initial grass height relative to stocking rate may have a positive effect on pasture utilization and milk production per unit area.

References

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